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MODERN SCIENCE AND AMERICAN TECHNOLOGY.

The Chemistry of Commerce. A Simple Interpretation of some New Chemistry in its Relation to Modern Industry. By Robert Kennedy Duncan. Pp. x+263. (London and New York: Harper and Brothers, 1907.)

THE author of the book with this alliterative and not very apt title is a teacher of chemical technology in a university of one of the western States of North America. He appears to have spent a year's leave in Europe in making himself more or less familiar with certain manufacturing processes depending upon more or less recondite facts of modern chemistry, and he is constrained to publish what he has learnt in the hope of convincing the American manufacturer, in particular, that modern science is "absolutely applicable" to the economy and progress of his operations. He was the more encouraged to put forth the present attempt for the reason that, as he tells us, a former venture of his received "words of appreciation" from mining engineers in South Africa and school teachers in China, as well as from captains of the navy and captains of industry. From which we may infer that the professor of industrial chemistry at the University of Kansas, of whose literary productions we confess we were hitherto in complete ignorance, is in reality one of the most widely-read authors of his time.

The dozen chapters of which the book is made up are so many detached fragments, and from the fact that they have been copyrighted at different times during the last three years, they would seem to be reprints of magazine or newspaper articles. Their literary style is indeed characteristic of much of Transatlantic journalism. When the author seeks to be convincing he is merely turgid and inflated, and what he strives to gain by emphasis he loses in the effect which might have been secured by sober, accurate, and impartial statement. Perhaps, however, Mr. Duncan is the best judge of the appetite of the class for whom he caters. His own particular world of educated laymen intellectually eager to know of the advance of knowledge, who, we are parenthetically informed, "are not fools," may like to have what he calls their "pabulum" served up to them hot and strong, and with plenty of condiments. But in his attempts to whet that appetite the author at times comes perilously near to the "sensational misinformation" of which we gather "the other fellow" has been occasionally guilty. Whilst regretfully admitting that in his book "there does not inhere the romantic interest attached to radio-activity and the nature of the chemist's atom," he yet claims for it "the glorious interest that attaches to the doing of real things."

These extracts from the author's "foreword" are characteristic of the rest of the work. He has a passion for strong words, and his vocabulary is simply amazing. But unfortunately the words

occasionally prove too strong for him; they get beyond his control—carry him off his feet, as it were—and rush him into a labyrinth of phrases where he gets effectually lost.

But to a reader who is not over-fastidious as regards literary style, or whose sensitiveness has been dulled by daily perusal of the journalism of Kansas, there is much in this book to interest and amuse. To begin with, the reader will not be bored by too much theory. Theory, we perceive, is not the author's strong point, and he has little sympathy with it. To him "the doing of real things is the preferred work of the world." He never forgets that he is a professor of technology. Speculations on the why and wherefore are, of course, not wanted in the eager, pushful, strenuous life of young America—at least not in Kansas; and as for the question "Why is gold?" it is, we are told, as insoluble as the question "Why is a hen?"

"No man of science can justifiably make of himself an anchorite." Shades of Cavendish and Cayley! Our author remembers a brilliant young researcher who "told him that he had developed a wholly new chapter in mathematics. 'And the best of it is,' he said with a glow of enthusiasm, 'that it can be of no earthly use, either practical or theoretical!' Had that man passed observingly through the vicious purlieus of the Bowery or through the vast sordid stretches of East London, surely it would have struck home to him that his work was not only not right, that it was a crime."

Oh! Mathematics, Mathematics! What crimes are committed in thy name! Perhaps it is an acute consciousness of this that leads the man of Trinity or the "gentle Johnian" to prefer King's Cross as a mode of entry to London rather than gaze upon the vast sordid stretches through which Liverpool Street is reached, and which a too selfish devotion to "pure" mathematics leaves neglected and unrelieved.

The American manufacturer, we gather, is not over-sensitive. If he were, he would surely wince under what the author calls the "stings and arrows" which are hurled against him in this book. The general character of much of American technology, we are told, is summed up in the phrase, "Save at the spigot and waste at the bung." What pulls the manufacturers through, however, is "expert office management," "efficiency of exclusive control obtained through business intrigue," "huge and lying advertisements," combined with "gross adulteration of manufactured products." This is a fair sample of the author's "pretty way" of expressing himself, but as he is a professor of technology in America he ought to know what he is talking about when he deals with American technology, and we must suppose, therefore, that his strictures are merited. Certainly the evidence he affords of "the utter stupidity and ignorance displayed by glass-makers" (in America) in the chemistry of their manufacture is only less marvellous than the ingenuity they display in the complicated and efficient mechanisms—for the most part of American origin

and device—which are to be found in their glass factories. But perhaps, after all, this is only the author's method of adorning his tale and of pointing his moral—to enable him, in fact, to bring out in high relief, and by forcible contrast with this story of confusion and waste, how the science of glass-making is studied and practised at Jena.

“The romantic deportment of the nitrogen atom”—due to a certain “temperamental nervousness” “which sends it flying on the slightest pretext from one atomic community to another,” is, he confesses, fascinatingly interesting, and this interest prompts him to follow the vagaries of this “labile element”—this “versatile restless nitrogen”—until it is caught and transformed into what he calls “Kaltstickstoff,” whence it passes into carrots and potatoes. The story, as a story, loses nothing in the telling as told by Mr. Duncan, but the serious student who eagerly desires “to know the significant results of modern knowledge” will be saddened, but not made wiser, by the total lack of accurate statement of ascertained facts in connection with “the problem of the fixation of nitrogen and what man may do when he must,” which constitutes the subject-matter of chapter iii.

America has recently grappled with the subject of industrial alcohol, and Mr. Duncan deals with the new departure in characteristic fashion. As regards the alcohols in general, “the one bearing the peculiarly graceful name of *Ethyl* is the flower of the sisterhood and the subject of chapter vii.” In beginning to enumerate its properties, “it is embarrassingly plain” that its properties “are not in one bundle”; “it is the most perplexing substance with which man has ever had to deal”—“a perfect femininity of varying and conflicting properties” functioning “ubiquitously and contrariwise in the affairs of man.” But chequered and dubious as is the reputation of “the flower of the sisterhood”—“the theme of poets, and contrariwise, the rage of publicists,” this “angel-demon” is sweetness and purity when compared with “the wine of wood”—methyl alcohol—of which it appears some ten million gallons “have, yearly, been floating about America in various use.”

“A not inconsiderable quantity of it is absorbed by the low negro populations of the country, who drink it under the appellation ‘white horse’ or ‘old mule,’ or by a pleasing mode of rhetorical transition, and in order, perhaps, to distinguish it from ‘Ethyl,’ as ‘Maude.’ Much of it again has appeared in ‘witch hazel,’ ‘bay rum,’ ‘eau de Cologne,’ ‘Florida water,’ essences, ‘Jamaica ginger,’ ‘extract of lemon,’ ‘liniments,’ patent medicine nostrums, and red ink. Poor and decadent people drink these things, and barring individual idiosyncrasies, whether it be a man in Indian Territory who drinks red ink, or a man in North Dakota who drinks ‘Jamaica ginger,’ there is apparently a fairly uniform result. Out of ten men who drink four ounces each of pure methyl alcohol in any form whatever, four will probably die, two of them becoming blind before death; the remaining six may recover, but of these two will probably be permanently blind. Even the absorption of its vapour through the lungs, or of the liquid through the skin, may produce permanent blindness. The ‘hearings’ before the Committee on Ways and

Means afford ample confirmation of this in the procession that filed before it of blind wrecks that had once been hat stiffeners, varnishers or shellackers, men who did not drink methyl alcohol, but who merely handled it as a solvent. The harm wrought by the substance has been greatly accentuated in the last few years by its manufacture and sale in a purified form, the so-called ‘deodorized’ methyl alcohol, whose smell gives no warning of its deadly nature.”

Let the sporadic drinkers of methylated spirit in this country now take warning from this fearful recital of the risks they run. Perhaps, too, the users of industrial alcohol among us may congratulate themselves that the revenue authorities now require only half the former quantity of this pernicious substance to be used in “methylation.” And perhaps, too, they may see some justification, in the interests of the community, for the maintenance of the present high duty on “potable” methyl alcohol. It was, of course, the relatively low price of this alcohol in America—70 cents as against 2 dollars and 8 cents for the taxed ethyl alcohol, that led to such a widespread substitution of the wood alcohol for the alcohol of fermentation.

What with the “whisky trust” “nobbling” the “wood naphtha trust,” and the druggists forcing up the retail price of industrial alcohol to ninety cents a gallon—“a disgrace,” says the author, “to commercial decency”—America is only at the beginning of her troubles in this matter, and there are already signs that the present regulations will have to be considerably modified if her manufacturers are to reap the full benefits of untaxed spirits.

The other chapters of the book deal with the industrial applications of catalysis; the use of the rare earths in illumination; the electric furnace, the manufacture of synthetic perfumes and of medicines; opsonins and inoculation, and the applications of cellulose. The last chapter gives an account of a scheme of industrial fellowships to be held in connection with a university which, like that of Kansas, enjoys the advantage of a department of applied chemistry, and the author illustrates its working by its application to the discovery of improvements in the chemistry of laundering, with the object of discovering “how the swift and progressive disintegration of the shirt” in the laundry may be arrested. Considering that the people of America pay a laundry bill of nearly twenty-five million dollars a week, Mr. Duncan thinks that a yearly subsidy of five hundred dollars, payable monthly to the holder of the fellowship for two years, in return for a comprehensive monograph on the chemistry of laundering, is the merest trifle in view of its bearing on the problem of the welfare of shirts. “What more can be desired by a young man at the threshold of his activity, even if it means that he must leave the ‘nook merely monastic’ of a professor in embryo for a life of industrial alarms and strenuous war?”

But this is only one of the many “exasperating, vitally important” problems which await solution at the hands of him who will combine the practical knowledge of the workshop with the special knowledge that awaits him in the class-rooms at Lawrence, Kansas, U.S.A.